Experiments to validate self-consistent beam-gas-electron code

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The WARP-POSINST model tracks beam ions and secondary particles (ions, electrons, gas molecules) in a self-consistent manner with techniques developed for heavy-ion fusion and e-cloud studies in high-intensity accelerators. We have developed simple experiments to exercise the code. Heavy-ion beams striking a surface cause gas desorption and electron emission, both of which can limit beam performance. Subsequent beam ions can ionize the gas, producing additional electrons. Two parallel plates, on either side of the beam and orthogonal to the end wall, are biased as a dipole: one grounded and the other biased to ±10 kV. The electron current to a positive plate jumps to the electron emission value; then ramps slowly due to ionization of desorbed gas. This is a rigorous test of the particle dynamics of the model and constrains the secondary particle production coefficients.